

THE CLAIMS

What is claimed is:

1. A cleaning composition useful for removing photoresist and/or sacrificial anti-reflective coating (SARC) materials from a substrate having such material(s) thereon, said composition including an active cleaning combination (ACC) selected from the group consisting of: (a) a quaternary ammonium base in combination with at least one of alkali and alkaline earth base; and (b) a strong base in combination with an oxidant.
2. The cleaning composition of claim 1, which is devoid of hydroxylamine therein.
3. The cleaning composition of claim 1, wherein said ACC comprises (a).
4. The cleaning composition of claim 3, comprising the following components:
 - 0.1 - 40.0 weight % organic quaternary ammonium base;
 - 0.01-5 weight % alkali or alkaline earth base;
 - 0-80 weight % solvent(s) and/or amine(s);
 - 0-5 weight % surfactant;
 - 0 - 10 weight % chelator/passivation agent; and
 - 0 - 98 weight % water,

wherein percentages of the components are percentages by weight, based on total weight of the composition, and wherein the total of the weight percentages of such components of the composition does not exceed 100 weight %.

5. The cleaning composition of claim 1, including at least one additional ingredient selected from the group consisting of stabilizers, dispersants, anti-oxidants, fillers, penetration agents, adjuvants, additives, fillers, and excipients.

6. The cleaning composition of claim 3, comprising the following components:

2-15 weight % organic quaternary ammonium base;

~0.01-2 weight % alkali or alkaline earth base;

0-50 weight % solvent(s) and/or amine(s);

~0.01-2 weight % surfactant;

0 – 5 weight % chelator/passivation agent; and

40 – 95 weight % water,

wherein percentages of the components are percentages by weight, based on total weight of the composition, and wherein the total of the weight percentages of such components of the composition does not exceed 100 weight %.

7. The cleaning composition of claim 1, selected from the group consisting of Formulations A-G, wherein all percentages are by weight, based on the total weight of the formulation:

Formulation A

5.36% benzyltrimethylammonium hydroxide

0.28% potassium hydroxide

3.0% 4-methylmorpholine N-oxide

0.30% polyoxyethylene(150) dinonylphenyl ether

0.08% 2-mercaptobenzimidazole

91.0% water

Formulation B

5.36% benzyltrimethylammonium hydroxide

0.28% potassium hydroxide

3.0% 4-methylmorpholine N-oxide

0.30% polyoxyethylene(150) dinonylphenyl ether

0.20% 5-amino-1,3,4-thiadiazole-2-thiol

90.86% water

Formulation C

3.60% benzyltrimethylammonium hydroxide

0.27% potassium hydroxide

3.5% 4-methylmorpholine N-oxide

15.0% 4-(3-aminopropyl)morpholine

0.30% polyoxyethylene(150) dinonylphenyl ether

0.08% 2-mercaptobenzimidazole

77.25% water

Formulation D

5.36% benzyltrimethylammonium hydroxide

0.28% potassium hydroxide

20.0% dimethyl sulfoxide

0.08% 2-mercaptobenzimidazole

74.28% water

Formulation E

5.36% benzyltrimethylammonium hydroxide

0.28% potassium hydroxide

10.0% tetramethylene sulfone

0.30% oxirane, methyl-, polymer with oxirane, ether with 2,2'-(oxidoimino)bis(ethanol)

(2:1), N(-3(C(-11-isoalkyloxy)propyl)derivatives, C₁₀-rich

0.08% 2-mercaptobenzimidazole

83.98% water

Formulation F

5.36% benzyltrimethylammonium hydroxide

0.28% potassium hydroxide

10.0% di(ethyleneglycol)butyl ether

10.0% 2-(2-dimethylamino)ethoxy)ethanol

0.30% oxirane, methyl-, polymer with oxirane, ether with 2.2'-(oxidoimino)bis(ethanol)

(2:1), N(-3(C(-11-isoalkyloxy)propyl)derivatives, C₁₀-rich

74.06% water

Formulation G

5.36% benzyltrimethylammonium hydroxide

0.28% potassium hydroxide

10.0% tetramethylene sulfone

10.0% di(ethyleneglycol)butyl ether

0.10% oxirane, methyl-, polymer with oxirane, mono(octylphenyl)ether

0.08% 2-mercaptobenzimidazole

74.18% water.

8. The cleaning composition of claim 1, wherein said ACC comprises (b).

9. The cleaning composition of claim 8, which includes an aqueous solution of at least one oxidant, a strong base, optionally a chelator and optionally a co-solvent and/or a surfactant.

10. The cleaning composition of claim 1, wherein the ACC comprises potassium hydroxide.

11. The cleaning composition of claim 8, including the following components:

0.1-30 wt % strong base;

0.01-30 wt % oxidant;

0-10 wt % chelator;

0-5 wt % surfactant;

0-50 wt % co-solvent; and

20-98.9 wt % deionized water,

wherein percentages of the components are percentages by weight, based on total weight of the composition, and wherein the total of the weight percentages of such components of the composition does not exceed 100 weight %.

12. The cleaning composition of claim 11, wherein the strong base comprises a base species selected from the group consisting of potassium hydroxide and alkylammonium hydroxides and choline hydroxide.

13. The cleaning composition of claim 8, wherein the oxidant comprises an oxidant species selected from the group consisting of hydrogen peroxide, amine-N-oxides, perborate salts, persulfate salts, and combinations of two or more of the foregoing.

14. The cleaning composition of claim 8, including a chelator.

15. The cleaning composition of claim 14, wherein the chelator comprises a chelator species selected from the group consisting of: triazoles; triazoles substituted with substituent(s) selected from the group consisting of C₁-C₈ alkyl, amino, thiol, mercapto,

imino, carboxy and nitro; thiazoles; tetrazoles; imidazoles; phosphates; thiols; azines; glycerols; amino acids; carboxylic acids; alcohols; amides; and quinolines.

16. The cleaning composition of claim 14, wherein the chelator comprises a chelator species selected from the group consisting of: 1,2,4-triazole; benzotriazole; tolyltriazole; 5-phenyl-benzotriazole; 5-nitro-benzotriazole; 4-methyl-2-phenylimidazole; 2-mercaptothiazoline; 1-amino-1,2,4-triazole; hydroxybenzotriazole; 2-(5-amino-pentyl)-benzotriazole; 1-amino-1,2,3-triazole; 1-amino-5-methyl-1,2,3-triazole; 3-amino-1,2,4-triazole; 3-mercapto-1,2,4-triazole; 3-amino-5-mercapto-1,2,4-triazole, 3-isopropyl-1,2,4-triazole; 5-phenylthiol-benzotriazole; halo-benzotriazoles wherein halo is selected from the group consisting of F, Cl, Br and I; naphthotriazole; 2-mercaptobenzoimidazole; 2-mercaptobenzothiazole; 5-aminotetrazole; 5-amino-1,3,4-thiadiazole-2-thiol; 2,4-diamino-6-methyl-1,3,5-triazine; thiazole; triazine; methyltetrazole; 1,3-dimethyl-2-imidazolidinone; 1,5-pentamethylenetetrazole; 1-phenyl-5-mercaptotetrazole; diaminomethyltriazine; mercaptobenzothiazole; imidazoline thione; mercaptobenzimidazole; 4-methyl-4H-1,2,4-triazole-3-thiol; 5-amino-1,3,4-thiadiazole-2-thiol; benzothiazole; tritoyl phosphate; indiazole; guanine; adenine; glycerol; thioglycerol; nitrilotriacetic acid; salicylamide; iminodiacetic acid; benzoguanamine; melamine; thiocyanuric acid; anthranilic acid; gallic acid; ascorbic acid; salicylic acid; 8-hydroxyquinoline; 5-carboxylic acid-benzotriazole; 3-mercaptopropanol; boric acid; and iminodiacetic acid.

17. The composition of claim 8, comprising a surfactant.

18. The composition of claim 17, wherein the surfactant comprises a surfactant species selected from the group consisting of: fluoroalkyl surfactants; polyethylene glycols; polypropylene glycols; polyethylene glycol ethers; polypropylene glycol ethers; carboxylic acid salts; dodecylbenzenesulfonic acid and salts thereof; polyacrylate polymers; dinonylphenyl polyoxyethylene; silicone polymers; modified silicone polymers; acetylenic diols; modified acetylenic diols, alkylammonium salts; modified alkylammonium salts; and combinations of two or more of the foregoing.

19. The composition of claim 8, comprising a co-solvent.

20. The composition of claim 19, wherein the co-solvent comprises a co-solvent species selected from the group consisting of: amines; glycols; glycol ethers; polyglycol ethers; and combinations of two or more of the foregoing.

21. The composition of claim 19, wherein the co-solvent comprises a co-solvent species selected from the group consisting of: dimethyldiglycolamine; 1,8-diazabicyclo[5.4.0]undecene; aminopropylmorpholine; triethanolamine; methylethanolamine; diethylene glycol; propylene glycol; neopentyl glycol; hydroxyethylmorpholine; aminopropylmorpholine; di(ethylene glycol)monoethyl ether; di(propylene glycol)propyl ether; ethylene glycol phenyl ether; di(propylene glycol) butyl ether; butyl carbitol; polyglycol ethers; and combinations of two or more of the foregoing.

22. The cleaning composition of claim 8, including:

0.1-30 wt % strong base

2-30 wt % oxidant

0-10 wt % chelator

0-5 wt % surfactant

0-50 % co-solvent

20-98 wt % deionized water

wherein percentages of the components are percentages by weight, based on total weight of the composition, and wherein the total of the weight percentages of such components of the composition does not exceed 100 weight %.

23. The cleaning composition of claim 1, selected from the group consisting of Formulations H-R², wherein all percentages are by weight, based on the total weight of the formulation:

Formulation H

tetramethylammonium hydroxide, 25% aqueous solution	14.7 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
3-amino-5-mercapto-1,2,4-triazole	0.1 %
water	73.9 %

Formulation I

tetramethylammonium hydroxide, 25% aqueous solution	14.7 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
ammonium tetrathiomolybdate	0.1 %
water	73.9 %

Formulation J

tetramethylammonium hydroxide, 25% aqueous solution	14.7 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
2-mercaptobenzimidazole	0.1 %
aminopropylmorpholine	20.0 %
water	53.9 %

Formulation K

tetramethylammonium hydroxide, 25% aqueous solution	14.7 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
2-mercaptobenzimidazole	0.1 %
N-ethylmorpholine	20.0 %
water	53.9 %

Formulation L

tetramethylammonium hydroxide, 25% aqueous solution	14.7 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
2-mercaptobenzimidazole	0.1 %
aminoethylpiperidine	20.0 %
water	53.9 %

Formulation M

tetramethylammonium hydroxide, 25% aqueous solution	14.7 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
3-amino-5-1,2,4-triazole	0.1 %
aminopropylmorpholine	20.0 %
water	53.9 %

Formulation N

tetramethylammonium hydroxide, 25% aqueous solution	14.7 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
3-amino-5-1,2,4-triazole	0.1 %
aminopropylmorpholine	10.0 %

water	63.9 %
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Formulation O

tetramethylammonium hydroxide, 25% aqueous solution	14.7 %
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N-methylmorpholine oxide, 50% aqueous solution	7.0 %
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dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
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2-mercaptobenzimidazole	0.1 %
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aminopropylmorpholine	20.0 %
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water	53.9 %
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Formulation P

tetramethylammonium hydroxide, 25% aqueous solution	14.7 %
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N-methylmorpholine oxide, 50% aqueous solution	7.0 %
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dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
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2-mercaptobenzimidazole	0.1 %
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aminopropylmorpholine	10.0 %
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water	63.9 %
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Formulation Q

benzyltrimethylammonium hydroxide, 40% aqueous solution	9.0 %
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potassium hydroxide, 45% aqueous solution	0.6 %
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N-methylmorpholine oxide, 50% aqueous solution	7.0 %
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dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
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2-mercaptobenzimidazole	0.1 %
aminopropylmorpholine	20.0 %
water	59.02 %

Formulation R

benzyltrimethylammonium hydroxide, 40% aqueous solution	9.0 %
potassium hydroxide, 45% aqueous solution	0.6 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
2-mercaptobenzimidazole	0.1 %
aminopropylmorpholine	15.0 %
water	64.02 %

Formulation S

benzyltrimethylammonium hydroxide, 40% aqueous solution	9.0 %
potassium hydroxide, 45% aqueous solution	0.6 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
2-mercaptobenzimidazole	0.1 %
aminopropylmorpholine	10.0 %
water	69.02 %

Formulation T

benzyltrimethylammonium hydroxide, 40% aqueous solution	13.4 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	78.62 %

Formulation U

benzyltrimethylammonium hydroxide, 40% aqueous solution	13.4 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
Potassium hydroxide, 45% aqueous solution	1.2 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	78.02 %

Formulation V

tetramethylammonium hydroxide, 25% aqueous solution	5.85 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
Potassium hydroxide, 45% aqueous solution	1.2 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	85.57 %

Formulation W

tetramethylammonium hydroxide, 25% aqueous solution	2.93 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
Potassium hydroxide, 45% aqueous solution	1.2 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	88.49 %

Formulation X

benzyltrimethylammonium hydroxide, 40% aqueous solution	7.2 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	84.82 %

Formulation Y

benzyltrimethylammonium hydroxide, 40% aqueous solution	3.6 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
Potassium hydroxide, 45% aqueous solution	1.2 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	87.82 %

Formulation Z

benzyltrimethylammonium hydroxide, 40% aqueous solution	3.6 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	88.42 %

Formulation A²

benzyltrimethylammonium hydroxide, 40% aqueous solution	7.2 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
Potassium hydroxide, 45% aqueous solution	0.3 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	85.12 %.

Formulation B²

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %

3-amino-5-mercapto-1,2,4-triazole	1.0 %
water	72.04 %

Formulation C²

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %
4-methyl-2-phenyl-imidazole	1.0 %
water	72.04 %

Formulation D²

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %
2-mercaptothiazoline	1.0 %
water	72.04 %

Formulation E²

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %
8-hydroxyquinoline	1.0 %
water	72.04 %

Formulation F²

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %
1-phenyl-2-tetrazoline-5-thione	1.0 %
water	72.04 %

Formulation G²

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %

gallic acid	1.0 %
water	72.04 %

Formulation H²

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %
salicylic acid	1.0 %
water	72.04 %

Formulation I²

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %
ascorbic acid	1.0 %
water	72.04 %

Formulation J²

benzyltrimethylammonium hydroxide, 40% aqueous solution	7.2 %
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Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
aminopropyl morpholine	10 %
4-methyl-2-phenyl-imidazole	1.0 %
water	81.12 %

Formulation K²

benzyltrimethylammonium hydroxide, 40% aqueous solution	7.2 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
aminopropyl morpholine	10 %
4-methyl-2-phenyl-imidazole	0.5 %
water	81.62 %

Formulation L²

benzyltrimethylammonium hydroxide, 40% aqueous solution	7.2 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
aminopropyl morpholine	10 %
4-methyl-2-phenyl-imidazole	1.0 %
water	81.02 %
dinonylphenol polyoxyethylene	0.1 %

Formulation M²

tetramethylammonium hydroxide, 25% aqueous solution	4.0 %
hydrogen peroxide, 30% aqueous solution	2.0 %
5-aminotetrazole	0.1 %
water	93.9 %

Formulation N²

tetramethylammonium hydroxide, 25% aqueous solution	4.0 %
hydrogen peroxide, 30% aqueous solution	2.0 %
2,4-diamino-6-methyl-1,3,5-triazine	0.1 %
water	93.9 %

Formulation O²

tetramethylammonium hydroxide, 25% aqueous solution	4.0 %
hydrogen peroxide, 30% aqueous solution	2.0 %
5-amino-1,3,4-thiadiazole-2-thiol	0.1 %
water	93.9 %

Formulation P²

tetramethylammonium hydroxide, 25% aqueous solution	4.0 %
hydrogen peroxide, 30% aqueous solution	2.0 %
1,2,4-triazole	0.1 %
water	93.9 %

Formulation Q²

tetramethylammonium hydroxide, 25% aqueous solution	4.0 %
hydrogen peroxide, 30% aqueous solution	2.0 %
2,4-dihydroxy-6-methylpyrimidine	0.1 %
water	93.9 %

Formulation R²

tetramethylammonium hydroxide, 25% aqueous solution	4.0 %
hydrogen peroxide, 30% aqueous solution	2.0 %
8-hydroxyquinoline	0.1 %
water	93.9 %.

24. A method of removing photoresist and/or SARC material from a substrate having said material thereon, said method comprising contacting the substrate with a cleaning composition for sufficient time to at least partially remove said material from the substrate, wherein the cleaning composition includes an active cleaning combination (ACC) selected from the group consisting of: (a) a quaternary ammonium base in combination with at least one of alkali and alkaline earth base; and (b) a strong base in combination with an oxidant.

25. The method of claim 24, wherein the substrate comprises a semiconductor device structure.

26. The method of claim 24, wherein the material comprises photoresist.
27. The method of claim 24, wherein the material comprises SARC material.
28. The method of claim 27, wherein the SARC material has been applied to a semiconductor device structure to minimize reflectivity variations during photolithographic patterning on the semiconductor device structure.
29. The method of claim 24, wherein said contacting is carried out for a time of from about 10 to about 45 minutes.
30. The method of claim 24, wherein said contacting is carried out at temperature in a range of from about 50°C to about 80°C.
31. The method of claim 24, wherein the composition is devoid of hydroxylamine therein.
32. The method of claim 24, wherein said ACC comprises (a).
33. The method of claim 32, wherein the composition comprises the following components:
- 0.1 - 40.0 weight % organic quaternary ammonium base;

0.01-5 weight % alkali or alkaline earth base;

0-80 weight % solvent(s) and/or amine(s);

0-5 weight % surfactant;

0 – 10 weight % chelator/passivation agent; and

0 – 98 weight % water,

wherein percentages of the components are percentages by weight, based on total weight of the composition, and wherein the total of the weight percentages of such components of the composition does not exceed 100 weight %.

34. The method of claim 24, wherein the composition includes at least one additional ingredient selected from the group consisting of stabilizers, dispersants, anti-oxidants, penetration agents, adjuvants, additives, fillers, and excipients.

35. The method of claim 32, wherein the composition comprises the following components:

2-15 weight % organic quaternary ammonium base;

~0.01-2 weight % alkali or alkaline earth base;

0-50 weight % solvent(s) and/or amine(s);

~0.01-2 weight % surfactant;

0 – 5 weight % chelator/passivation agent; and

40 – 95 weight % water,

wherein percentages of the components are percentages by weight, based on total weight of the composition, and wherein the total of the weight percentages of such components of the composition does not exceed 100 weight %.

36. The method of claim 24, wherein the cleaning composition is selected from the group consisting of Formulations A-G, wherein all percentages are by weight, based on the total weight of the formulation:

Formulation A

benzyltrimethylammonium hydroxide	5.36%
potassium hydroxide	0.28%
4-methylmorpholine N-oxide	3.0%
polyoxyethylene(150) dinonylphenyl ether	0.30%
2-mercaptobenzimidazole	0.08%
water	91.0%

Formulation B

benzyltrimethylammonium hydroxide	5.36%
potassium hydroxide	0.28%
4-methylmorpholine N-oxide	0.28%
polyoxyethylene(150) dinonylphenyl ether	0.30%
5-amino-1,3,4-thiadiazole-2-thiol	0.20%
water	90.86%

Formulation C

benzyltrimethylammonium hydroxide	3.60%
potassium hydroxide	0.27%
4-methylmorpholine N-oxide	3.5%
4-(3-aminopropyl)morpholine	15.0%
polyoxyethylene(150) dinonylphenyl ether	0.30%
2-mercaptobenzimidazole	0.08%
water	77.25%

Formulation D

benzyltrimethylammonium hydroxide	5.36%
potassium hydroxide	0.28%
dimethyl sulfoxide	20.0%
2-mercaptobenzimidazole	0.08%
water	74.28%

Formulation E

benzyltrimethylammonium hydroxide	5.36%
potassium hydroxide	0.28%
tetramethylene sulfone	10.0%
oxirane, methyl-, polymer with oxirane, ether with	0.30%

2,2'-(oxidoimino)bis(ethanol) (2:1), N(-3

(C(-11-isoalkyloxy)propyl)derivatives, C₁₀-rich

2-mercaptobenzimidazole	0.08%
water	83.98%

Formulation F

benzyltrimethylammonium hydroxide	5.36%
potassium hydroxide	0.28%
di(ethyleneglycol)butyl ether	10.0%
2-(2-dimethylamino)ethoxy)ethanol	10.0%
oxirane, methyl-, polymer with oxirane, ether with	0.30%

2.2'-(oxidoimino)bis(ethanol) (2:1), N(-3

(C(-11-isoalkyloxy)propyl)derivatives, C₁₀-rich

water	74.06%
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Formulation G

benzyltrimethylammonium hydroxide	5.36%
potassium hydroxide	10.0%
tetramethylene sulfone	10.0%
di(ethyleneglycol)butyl ether	10.0%
oxirane, methyl-, polymer with oxirane, mono(octylphenyl)ether	0.10%
2-mercaptobenzimidazole	0.08%
water	74.18%

37. The method of claim 24, wherein said ACC comprises (b).

38. The method of claim 37, wherein the cleaning composition includes an aqueous solution of at least one oxidant, a strong base, optionally a chelator and optionally a co-solvent and/or a surfactant.

39. The method of claim 24, wherein the ACC comprises potassium hydroxide.

40. The method of claim 37, wherein the cleaning composition includes the following components:

0.1-30 wt % strong base;

0.01-30 wt % oxidant;

0-10 wt % chelator;

0-5 wt % surfactant;

0-50 wt % co-solvent; and

20-98.9 wt % deionized water,

wherein percentages of the components are percentages by weight, based on total weight of the composition, and wherein the total of the weight percentages of such components of the composition does not exceed 100 weight %.

41. The method of claim 40, wherein the strong base comprises a base species selected from the group consisting of potassium hydroxide, alkylammonium hydroxides and choline hydroxide.

42. The method of claim 37, wherein the oxidant comprises an oxidant species selected from the group consisting of hydrogen peroxide, organic peroxides, amine-N-oxides, perborate salts, persulfate salts, and combinations of two or more of the foregoing.

43. The method of claim 37, including a chelator.

44. The method of claim 43, wherein the chelator comprises a chelator species selected from the group consisting of: triazoles; triazoles substituted with substituent(s) selected from the group consisting of C₁-C₈ alkyl, amino, thiol, mercapto, imino, carboxy and nitro; thiazoles; tetrazoles; imidazoles; phosphates; thiols; azines; glycerols; amino acids; carboxylic acids; alcohols; amides; and quinolines.

45. The method of claim 43, wherein the chelator comprises a chelator species selected from the group consisting of: 1,2,4-triazole; benzotriazole; tolyltriazole; 5-phenyl-benzotriazole; 5-nitro-benzotriazole; 1-amino-1,2,4-triazole; hydroxybenzotriazole; 2-(5-amino-pentyl)-benzotriazole; 1-amino-1,2,3-triazole; 4-methyl-2phenylimidazole; 2-mercaptothiazoline; 1-amino-5-methyl-1,2,3-triazole; 3-amino-1,2,4-triazole; 3-amino-5-mercapto-1,2,4-triazole, 3-mercapto-1,2,4-triazole; 3-isopropyl-1,2,4-triazole; 5-phenylthiol-benzotriazole; halo-benzotriazoles wherein halo is selected from the group

consisting of F, Cl, Br and I; naphthotriazole; 2-mercaptobenzoimidazole; 2-mercaptobenzothiazole; 5-aminotetrazole; 5-amino-1,3,4-thiadiazole-2-thiol; 2,4-diamino-6-methyl-1,3,5-triazine; thiazole; triazine; methyltetrazole; 1,3-dimethyl-2-imidazolidinone; 1,5-pentamethylenetetrazole; 1-phenyl-5-mercaptopotetrazole; diaminomethyltriazine; mercaptobenzothiazole; imidazoline thione; mercaptobenzimidazole; 4-methyl-4H-1,2,4-triazole-3-thiol; 5-amino-1,3,4-thiadiazole-2-thiol; benzothiazole; tritolyl phosphate; indiazole; guanine; adenine; glycerol; thioglycerol; nitrilotriacetic acid; salicylamide; iminodiacetic acid; benzoguanamine; melamine; thiocyanuric acid; anthranilic acid; gallic acid; ascorbic acid; salicylic acid; 8-hydroxyquinoline; 5-carboxylic acid-benzotriazole; 3-mercaptopropanol; boric acid; and iminodiacetic acid.

46. The method of claim 37, wherein the cleaning composition comprises a surfactant.

47. The method of claim 46, wherein the surfactant comprises a surfactant species selected from the group consisting of: fluoroalkyl surfactants; polyethylene glycols; polypropylene glycols; polyethylene glycol ethers; polypropylene glycol ethers; carboxylic acid salts; dodecylbenzenesulfonic acid and salts thereof; polyacrylate polymers; dinonylphenyl polyoxyethylene; silicone polymers; modified silicone polymers; acetylenic diols; modified acetylenic diols, alkylammonium salts; modified alkylammonium salts; and combinations of two or more of the foregoing.

48. The method of claim 37, wherein the cleaning composition includes a co-solvent.

49. The method of claim 48, wherein the co-solvent comprises a co-solvent species selected from the group consisting of: amines; glycols; glycol ethers; polyglycol ethers; and combinations of two or more of the foregoing.

50. The method of claim 48, wherein the co-solvent comprises a co-solvent species selected from the group consisting of: dimethyldiglycolamine; 1,8-diazabicyclo[5.4.0]undecene; methyldiethanolamine; aminopropylmorpholine; triethanolamine; methylethanolamine; diethylene glycol; propylene glycol; neopentyl glycol; hydroxyethylmorpholine; aminopropylmorpholine; di(ethylene glycol)monoethyl ether; di(propylene glycol)propyl ether; ethylene glycol phenyl ether; di(propylene glycol) butyl ether; butyl carbitol; polyglycol ethers; and combinations of two or more of the foregoing.

51. The method of claim 37, wherein the composition includes:

0.1-30 wt % strong base

2-30 wt % oxidant

0-10 wt % chelator

0-50 % co-solvent

0-5 wt % surfactant

20-98 wt % deionized water

wherein percentages of the components are percentages by weight, based on total weight of the composition, and wherein the total of the weight percentages of such components of the composition does not exceed 100 weight %.

52. The method of claim 24, wherein the cleaning composition is selected from the group consisting of Formulations H-G², wherein all percentages are by weight, based on the total weight of the formulation:

Formulation H

tetramethylammonium hydroxide, 25% aqueous solution	14.7 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
3-amino-5-mercapto-1,2,4-triazole	0.1 %
water	73.9 %

Formulation I

tetramethylammonium hydroxide, 25% aqueous solution	14.7 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
ammonium tetrathiomolybdate	0.1 %
water	73.9 %

Formulation J

tetramethylammonium hydroxide, 25% aqueous solution	14.7 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
2-mercaptobenzimidazole	0.1 %
aminopropylmorpholine	20.0 %
water	53.9 %

Formulation K

tetramethylammonium hydroxide, 25% aqueous solution	14.7 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
2-mercaptobenzimidazole	0.1 %
N-ethylmorpholine	20.0 %
water	53.9 %

Formulation L

tetramethylammonium hydroxide, 25% aqueous solution	14.7 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
2-mercaptobenzimidazole	0.1 %
aminoethylpiperidine	20.0 %
water	53.9 %

Formulation M

Tetramethylammonium hydroxide, 25% aqueous solution	14.7 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
Dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
3-amino-5-1,2,4-triazole	0.1 %
Aminopropylmorpholine	20.0 %
water	53.9 %

Formulation N

tetramethylammonium hydroxide, 25% aqueous solution	14.7 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
3-amino-5-1,2,4-triazole	0.1 %
aminopropylmorpholine	10.0 %
water	63.9 %

Formulation O

tetramethylammonium hydroxide, 25% aqueous solution	14.7 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
2-mercaptobenzimidazole	0.1 %
aminopropylmorpholine	20.0 %
water	53.9 %

Formulation P

tetramethylammonium hydroxide, 25% aqueous solution	14.7 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
2-mercaptobenzimidazole	0.1 %
aminopropylmorpholine	10.0 %
water	63.9 %

Formulation Q

benzyltrimethylammonium hydroxide, 40% aqueous solution	9.0 %
potassium hydroxide, 45% aqueous solution	0.6 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
2-mercaptobenzimidazole	0.1 %
aminopropylmorpholine	20.0 %
water	59.02 %

Formulation R

benzyltrimethylammonium hydroxide, 40% aqueous solution	9.0 %
potassium hydroxide, 45% aqueous solution	0.6 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %

2-mercaptobenzimidazole	0.1 %
aminopropylmorpholine	15.0 %
water	64.02 %

Formulation S

benzyltrimethylammonium hydroxide, 40% aqueous solution	9.0 %
potassium hydroxide, 45% aqueous solution	0.6 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
dinonylphenol ethoxylate, 7% aqueous solution	4.3 %
2-mercaptobenzimidazole	0.1 %
aminopropylmorpholine	10.0 %
water	69.02 %

Formulation T

benzyltrimethylammonium hydroxide, 40% aqueous solution	13.4 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	78.62 %

Formulation U

benzyltrimethylammonium hydroxide, 40% aqueous solution	13.4 %
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N-methylmorpholine oxide, 50% aqueous solution	7.0 %
Potassium hydroxide, 45% aqueous solution	1.2 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	78.02 %

Formulation V

tetramethylammonium hydroxide, 25% aqueous solution	5.85 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
Potassium hydroxide, 45% aqueous solution	1.2 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	85.57 %

Formulation W

tetramethylammonium hydroxide, 25% aqueous solution	2.93 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
Potassium hydroxide, 45% aqueous solution	1.2 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	88.49 %

Formulation X

benzyltrimethylammonium hydroxide, 40% aqueous solution	7.2 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	84.82 %

Formulation Y

benzyltrimethylammonium hydroxide, 40% aqueous solution	3.6 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
Potassium hydroxide, 45% aqueous solution	1.2 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	87.82 %

Formulation Z

benzyltrimethylammonium hydroxide, 40% aqueous solution	3.6 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	88.42 %

Formulation A²

benzyltrimethylammonium hydroxide, 40% aqueous solution	7.2 %
N-methylmorpholine oxide, 50% aqueous solution	7.0 %
Potassium hydroxide, 45% aqueous solution	0.3 %
2-mercaptobenzimidazole	0.08 %
dinonylphenol polyoxyethylene	0.3 %
water	85.12 %

Formulation B²

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %
3-amino-5-mercapto-1,2,4-triazole	1.0 %
water	72.04 %

Formulation C²

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %

phosphoric acid (86 %)	1.69 %
4-methyl-2-phenyl-imidazole	1.0 %
water	72.04 %

Formulation D²

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %
2-mercaptothiazoline	1.0 %
water	72.04 %

Formulation E²

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %
8-hydroxyquinoline	1.0 %
water	72.04 %

Formulation F²

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %
1-phenyl-2-tetrazoline-5-thione	1.0 %
water	72.04 %

Formulation G²

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %
gallic acid	1.0 %
water	72.04 %

Formulation H²

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %

salicylic acid	1.0 %
water	72.04 %

Formulation I²

benzyltrimethylammonium hydroxide, 40% aqueous solution	22.26 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
methyldiethanolamine	2.33 %
phosphoric acid (86 %)	1.69 %
ascorbic acid	1.0 %
water	72.04 %

Formulation J²

benzyltrimethylammonium hydroxide, 40% aqueous solution	7.2 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
aminopropyl morpholine	10 %
4-methyl-2-phenyl-imidazole	1.0 %
water	81.12 %

Formulation K²

benzyltrimethylammonium hydroxide, 40% aqueous solution	7.2 %
Potassium hydroxide, 45% aqueous solution	0.6 %

2-mercaptobenzimidazole	0.08 %
aminopropyl morpholine	10 %
4-methyl-2-phenyl-imidazole	0.5 %
water	81.62 %

Formulation L²

benzyltrimethylammonium hydroxide, 40% aqueous solution	7.2 %
Potassium hydroxide, 45% aqueous solution	0.6 %
2-mercaptobenzimidazole	0.08 %
aminopropyl morpholine	10 %
4-methyl-2-phenyl-imidazole	1.0 %
water	81.02 %
dinonylphenol polyoxyethylene	0.1 %

Formulation M²

tetramethylammonium hydroxide, 25% aqueous solution	4.0 %
hydrogen peroxide, 30% aqueous solution	2.0 %
5-aminotetrazole	0.1 %
water	93.9 %

Formulation N²

tetramethylammonium hydroxide, 25% aqueous solution	4.0 %
hydrogen peroxide, 30% aqueous solution	2.0 %
2,4-diamino-6-methyl-1,3,5-triazine	0.1 %
water	93.9 %

Formulation O²

tetramethylammonium hydroxide, 25% aqueous solution	4.0 %
hydrogen peroxide, 30% aqueous solution	2.0 %
5-amino-1,3,4-thiadiazole-2-thiol	0.1 %
water	93.9 %

Formulation P²

tetramethylammonium hydroxide, 25% aqueous solution	4.0 %
hydrogen peroxide, 30% aqueous solution	2.0 %
1,2,4-triazole	0.1 %
water	93.9 %

Formulation Q²

tetramethylammonium hydroxide, 25% aqueous solution	4.0 %
hydrogen peroxide, 30% aqueous solution	2.0 %
2,4-dihydroxy-6-methylpyrimidine	0.1 %
water	93.9 %

Formulation R²

tetramethylammonium hydroxide, 25% aqueous solution	4.0 %
hydrogen peroxide, 30% aqueous solution	2.0 %
8-hydroxyquinoline	0.1 %
water	93.9 %.